

# Imaging of Pectoralis Major Injury

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## Disclosures

- Book Royalties: Elsevier
- Consultant: Bioclinica
- Medical Director: POCUSPRO
- Not relevant to this talk

Syllabus on line and other educational material:  
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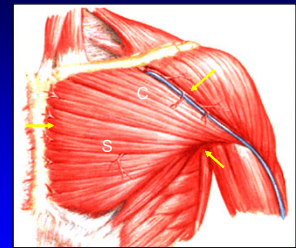
## Background:

- Ultrasound and MRI
  - Effective: diagnosis and characterization of pectoralis major injury
- Pitfalls: errors in diagnosis
  - Due to complex anatomy
  - Unfamiliar: recent redefined anatomic descriptions

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## Pectoralis Major

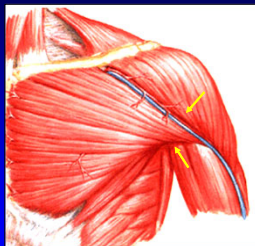
- Clavicular head:
  - Lamina from medial clavicle
- Sternal head
  - Manubrial and costal laminae



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## Pectoralis Major

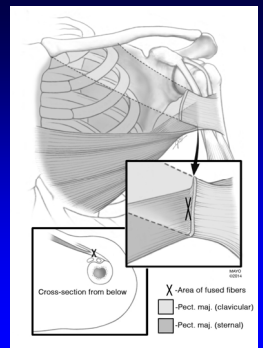
- Attachment:
  - Courses over biceps brachii long head tendon
  - Inserts lateral to biceps brachii tendon
  - Anterior humeral shaft
  - 4 – 6 cm cephalocaudad
  - Note: twisting



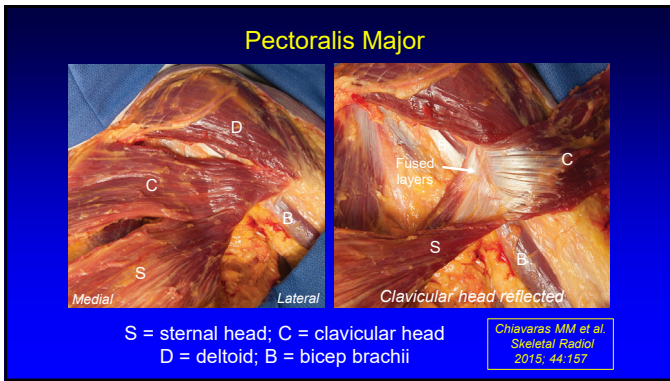
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## Pectoralis Major

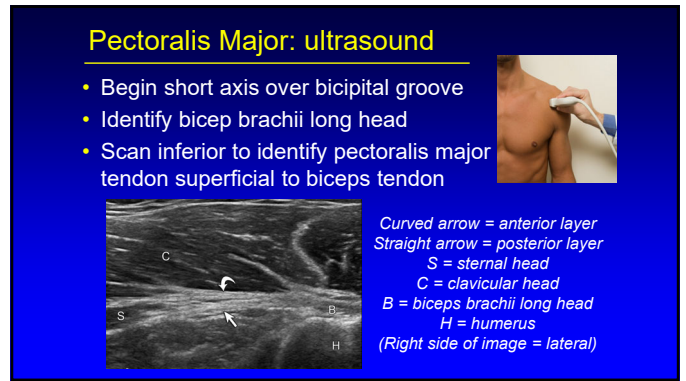
- Clavicular head:
  - Forms anterior layer
- Sternal head:
  - Forms posterior layer and inferior aspect of anterior layer
- Each layer: 2 mm thick
- “U” shaped
- Fuses 11 mm proximal to insertion



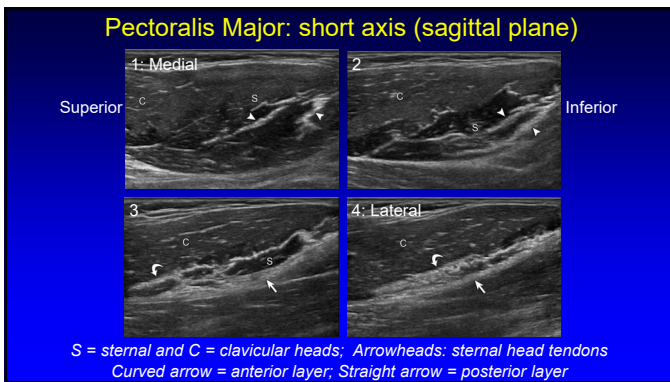
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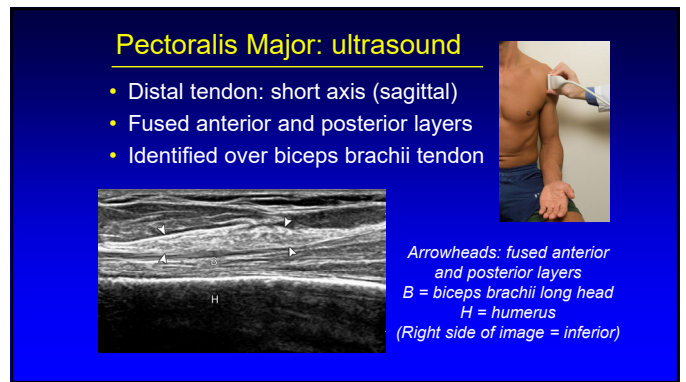
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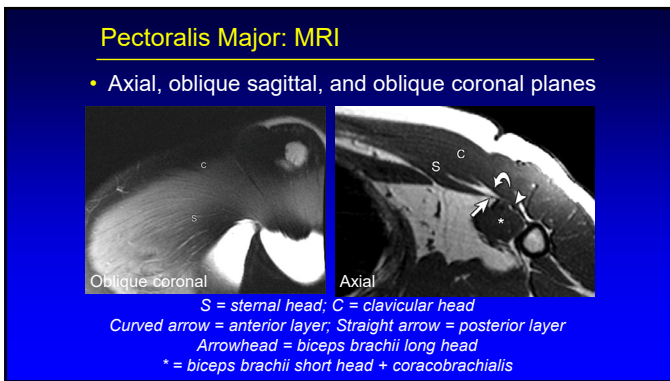
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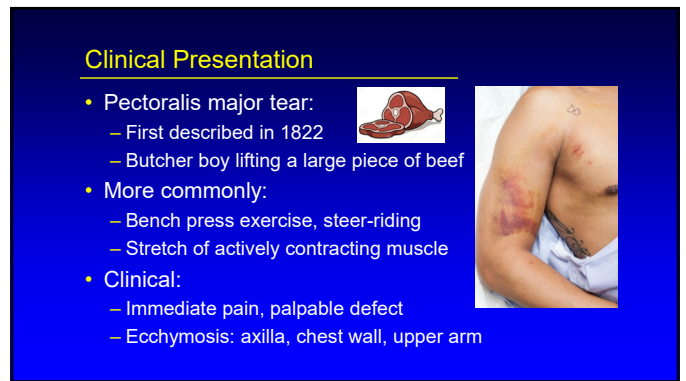
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### Pectoralis Major: tear classification

- Musculotendinous junction
  - Most common
  - Partial sternal head
- Intra-tendinous
- Humeral insertion
- Bony avulsion

TEAR LOCATION		MANAGEMENT	
		Non-Operative	
			Operative (IIB) (suture, bone tunnel, bone anchor)
		Operative (Internal fixation)	

*El Maraghy AW et al. J Sho Elb Surg 2012; 21:412*

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### Pectoralis Major Tear Classification

- Partial tear: if only one layer (anterior or posterior)
- Full-width versus incomplete width of a layer
- Tear sequence: posterior to anterior (arrows)

CB = coracobrachialis; B = biceps brachii; H = humerus

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### Pectoralis Tear: imaging findings

- Full-thickness (anterior + posterior layers):
  - Retracted tendon + hemorrhage over coracobrachialis / short head biceps
  - No tendon over biceps brachii long head
  - Fluid/edema at humerus
  - Anterior displacement of biceps brachii tendon

Connell DA, et al. Radiology 1999;210:785  
Weaver JS, et al. J Ultrasound Med 2005;24:25

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### Case 1: full-thickness, full-width tear

Curved arrow = torn and retracted pectoralis major  
\* = short head biceps brachii + coracobrachialis  
Arrowhead = biceps brachii long head; D = deltoid

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### Case 2: full-thickness, full-width tear

Curved arrow = torn and retracted pectoralis major  
Arrow = tendon stump  
\* = short head biceps brachii + coracobrachialis  
Arrowhead = biceps brachii long head; D = deltoid  
S = sternal and C = clavicular heads; M = pectoralis minor

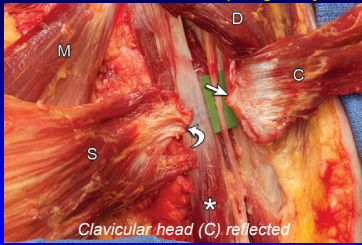
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### Pectoralis Tear: imaging findings

- Partial thickness
  - Posterior layer torn (sternal head)
  - Medial to fused anterior / posterior layers
  - Intact tendon superficial to biceps long head (fused anterior + posterior layers)
  - Fluid: musculotendinous junction or deltopectoral groove
  - Intact clavicular head

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**Case 3: partial-thickness, full-width sternal head tear (surgically created)**

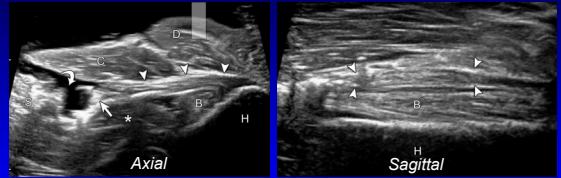


Curved arrow = torn sternal head (S); Arrow = posterior layer  
 \* = short head biceps brachii + coracobrachialis  
 M = pectoralis minor; D = deltoid

Chiavaras MM et al. *Skeletal Radiol* 2015; 44:157

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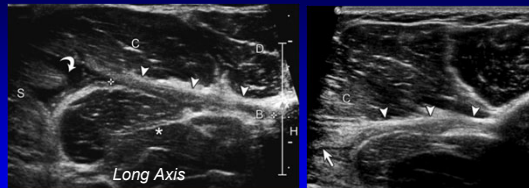
**Case 3: partial-thickness, full-width sternal head tear (surgically created)**



Curved arrow = torn sternal head (S); Arrow = posterior layer  
Note: intact fused anterior and posterior layers (arrowheads) over biceps brachii long head tendon (B)  
 \* = short head biceps brachii + coracobrachialis  
 D = deltoid; H = humerus

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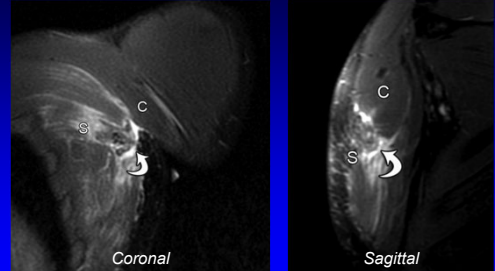
**Case 4: partial-thickness, full-width sternal head tear**



Curved arrow = torn sternal head (S)  
Note: intact fused anterior and posterior layers (arrowheads) over biceps brachii long head tendon (B)  
 \* = short head biceps brachii + coracobrachialis  
 C = clavicular head; D = deltoid; H = humerus

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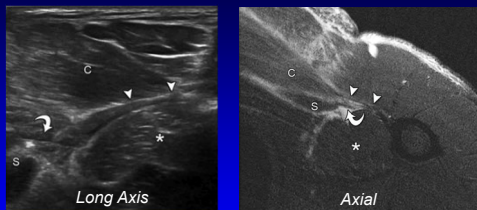
**Case 4: partial-thickness, full-width sternal head tear**



Curved arrow = sternal head (S) retracted tear  
 C = clavicular head

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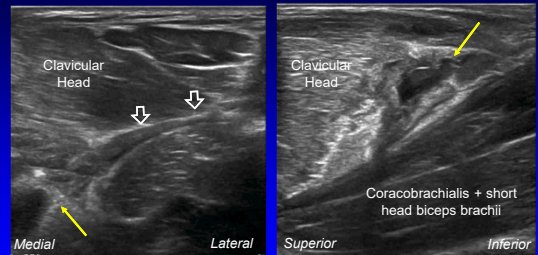
**Case 5: partial-thickness, full-width sternal head tear**



Curved arrow = torn sternal head (S)  
Note: intact fused anterior and posterior layers (arrowheads) over biceps brachii long head tendon (B)  
 \* = short head biceps brachii + coracobrachialis  
 C = clavicular head

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**Case 5: partial-thickness, full-width sternal head tear (arrow)**



Note: intact fused anterior and posterior layers (open arrows)

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### Take Home Points

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- Partial-thickness tear
  - Most common
  - Sternal head medial to fused layers
  - Hematoma over short head biceps / coracobrachialis
- Full-thickness tear
  - No tendon over biceps brachii long head
  - Fluid around biceps with anterior displacement

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Thank you!

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[www.jacobsonmskus.com](http://www.jacobsonmskus.com)

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